PIMA COUNTY REGIONAL FLOOD CONTROL DISTRICT
TECHNICAL PROCEDURE

PROCEDURE NO: Technical Procedure, TECH-114 **EFFECTIVE DATE:** February 1, 2009
REVISED DATE: November 2, 2015

POLICY NAME: Requirements for Content of Hydrologic and Hydraulic Reports (hereinafter referred to as Drainage Report)

PURPOSE:
To provide guidance on the content of Drainage Reports to be submitted with site permit plans and tentative plats.

BACKGROUND:
Technical Policy TECH-114 is issued to supersede all previous Regional Flood Control District (District) policies listing the requirements for the information to be included in Drainage Reports.

Regulatory peak discharges and floodplains are those associated with 100-year peak discharges of 100 cfs or greater.

PROCEDURE:
Whenever a Drainage Report is required, it should, at a minimum, contain the following engineering information as specified below:

A. Cover Sheet

1. Project name.
2. Approximate location of project including Township, Range and Section(s).
3. Vertical datum used in the Drainage Report.
4. Name, address, telephone number and email address of the client for whom the Drainage Report was prepared.
5. Name, address, telephone number, and email address of the engineering firm responsible for the Drainage Report.
6. Submittal date.
7. Dated seal and signature of an Arizona Registered Professional Civil Engineer.

B. Table of Contents

1. Drainage Report sections.
2. Figures
3. Tables
4. Appendices

C. General Project and Contributing Watershed Description
A summary that addresses the following:

1. Description of the general location of the project.

2. Location map that shows the physical relationship of the project to nearby properties, major streets and watercourses at a minimum scale of 3 inches = 1 mile with the project boundaries identified.
3. Description of the proposed development within the project.
4. Description of the existing conditions within the project, including soils, vegetation density, impervious cover and mapped riparian habitat.
5. Description of the existing conditions within the watershed(s) affecting the project.
6. Description of any physical feature within the project or contributing watershed(s) that affects the hydrology and/or hydraulics of the project.
7. Aerial photo of the project with date and source of photo noted to standard engineering scale.
8. Description of the FEMA Flood Zone(s) in which the project is located with the Flood Insurance Rate Map (FIRM) Panel(s) indicated and the effective date of the FIRM Panel(s). If applicable, note if the project is located within any Letter of Map Revision (LOMR) boundary and its case number and date, and/or the date of submittal to the District of the Conditional Letter of Map Revision (CLOMR) related to the project.
9. A copy of the applicable FIRM Panel(s) with the project boundaries identified.
10. Description of the District's Special Studies and/or other locally identified regulatory floodplain(s), if applicable.
11. Description of the floodplain(s), sheet-flooding areas and, erosion hazard areas associated with any peak discharge of 100 cfs or greater determined by this study.
12. Description of the type of watershed basin (i.e., critical or balanced) in which the project is located.
13. Site-specific summary of District detention and/or retention requirements.
14. Description of re-zoning conditions affecting drainage design.
15. Copies of immediately adjacent site plans, if available.
16. Statement regarding the U.S. Army Corps of Engineers' 404 Permit requirements with an accompanying 404 Compliance Statement signed and sealed by the engineer of record for the project.

D. Procedures

1. Description of the analytical methodology and assumptions used in preparing the Drainage Report.
2. Description of any previous drainage studies that affect the project with references. If discharges from previous studies are used as design discharges, the engineer of record shall include a statement that the input parameters and methodologies used are in conformance with District approved methodology and sound engineering judgment and that the engineer of record incorporates the previously determined discharges under his or her seal.

E. Hydrology & Hydraulics

1. Offsite Drainage
    a. Description of the offsite watershed(s) that affect the project including, but not limited to, existing infrastructure, land use, vegetation density, hydrologic soils and percentage of imperviousness.
    b. A hydrologic soils map with the project boundaries identified.

c. Watershed map drawn to scale showing delineation of labeled watershed(s) on aerial photo with topography.
d. Description of existing 100-year peak discharge(s) with supporting hydrologic calculations or report reference for each concentration point at property boundaries in the form of data sheets or CD of hydrologic modeling accepted by the District.
e. Hydrologic data presented in table format indicating, at a minimum, the concentration point, existing 100-year peak discharge, and associated drainage areas.
f. A drainage exhibit showing the location of the concentration point(s) at property boundaries and the associated 100-year peak discharge(s) and contributing drainage area(s) where drainage enters the project.

2. Onsite Drainage/Existing Conditions
    a. Description of the site-specific drainage conditions of the onsite watershed(s) including any existing infrastructure, land use, vegetation density, hydrologic soils groups and percentage of imperviousness. Provide a soils map if multiple soils groups exist within project boundaries.
    b. Description of <u>existing</u> 100-year peak discharge(s) with supporting hydrologic analysis for each concentration point.
    c. Hydrologic data presented in a table format indicating, at a minimum, the concentration point, existing 100-year peak discharge, and associated drainage areas.
    d. A drainage exhibit showing:
        i. <u>Existing</u> drainage conditions of the project including onsite watershed boundaries and drainage infrastructure. Show all concentration point(s) and their associated 100-year peak discharge(s) and drainage area(s) including where drainage exits the property.
        ii. <u>Existing</u> regulatory floodplain delineations with associated erosion hazard setback including FEMA floodplain(s), locally-identified floodplain(s) and sheet-flooding areas.
        iii. For regulatory floodplains, hydraulic cross-sections labeled by station and separated a maximum of 200 feet showing the water surface elevation with reference to the appropriate vertical datum.
        iv. Provide the average depth of flow and extent of flooding for regulatory sheet-flooding areas.

3. Onsite Drainage/Proposed Conditions
    a. Description of <u>proposed</u> drainage conditions of the project with supporting hydraulic calculations for channels, storm drains, drainage openings in block walls, curb openings, culverts, scuppers, catch basins, erosion/scour protection and any other proposed development or infrastructure that affects drainage on the project.
    b. Description of <u>proposed</u> 100-year peak discharge(s) with supporting hydrologic analysis for each concentration point.
    c. Hydrologic data presented in a table format indicating, at a minimum, the concentration point, proposed 100-year peak discharge, and associated drainage areas.

d. A drainage exhibit showing:
    i. Proposed drainage conditions of the project including onsite watershed boundaries and drainage infrastructure. Show all concentration point(s) and their associated 100-year peak discharge(s) and drainage area(s) including where drainage exits the property.
    ii. Show 100-year peak discharges at all drainage structures and within streets.
    iii. Proposed regulatory floodplain delineations with associated erosion hazard setback. If a change to the FEMA floodplain boundary is proposed, a Conditional Letter of Map Revision (CLOMR) is required to be submitted and approved by the District prior to approval of the site permit or final plat.
    iv. For regulatory floodplains provide hydraulic cross-sections labeled by station and separated a maximum of 200 feet showing the water surface elevation with reference to the appropriate vertical datum.
    v. The average depth of flow and extent of flooding for regulatory sheet-flooding areas.

e. Details and hydraulic modeling of the proposed drainage infrastructure including, but not limited to, the following:
    i. Inlet/outlet protection details and calculations.
    ii. Street sections with hydraulic capacity.
    iii. Profiles of culverts and storm drains.
    iv. Cross-sections for channels with hydraulic information including normal depth, velocity, roughness coefficient and freeboard.
    v. Scupper dimensions with supporting calculations.
    vi. If bank protection is proposed, provide scour depth analysis and cross-section including toe-down depth.
f. A CD with computer files for any hydraulic modeling included in the Drainage Report.

4. Detention/Retention
    a. A summary of detention and/or retention requirements supported by hydrologic and hydraulic calculations for retention/detention requirements and basin design as required by the *Design Standards for Stormwater Detention and Retention.*
    b. Details of inlet and outlet structures, with cross-sections perpendicular and parallel to the structures.
    c. Cross-section of the basin.

5. Comparison of Existing and Proposed Conditions
    a. Summary statement that the proposed drainage configuration is compatible with existing upstream and downstream drainage conditions.
    b. Table of hydrologic data comparing all existing and proposed conditions for perimeter concentration points, 100-year peak discharges and drainage areas.

c. If applicable, a table of the encroachment analysis indicating, at a minimum, the cross-section, existing water surface elevation, existing velocity, developed water surface elevation and developed velocity.

F. Summary and Conclusions

1. A brief summary of the important analyses and conclusions presented in the Drainage Report.

APPROVED BY:

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Suzanne Shields, P.E. **Date**
Director and Chief Engineer

Original Policy Approved: 2/1/2009
Date(s) Revised: 11/2/2015